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Massage in Traumatic Paralysis

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MASSAGE IN TRAUMATIC PARALYSIS.*

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Surgeon Rock Island Lines.

Paralysis is understood as the loss of motion or sensation in a living part or member.

As a matter of fact it is a symptom of nervous lesion, manifested as a cessation of one or more functions in a living organ, due to arrest of nervous force or its conduction. The term is popularly applied to interruption of motor activity; loss of sensation is known as anesthesia.

Paralysis may be classified as cerebral, cerebrospinal and paralysis due to lesion or injury of the peripheral nerves.

In the cerebral variety, the central neurons, located in the cortex of the brain, are involved. The axons of these neurons extend to, and terminate in the basal ganglia, in the pons, medulla and anterior horns. They are also called upper or secondary neurons, and 90 per cent cross to the opposite side in the pons and upper part of medulla to connect with the cranial nerves, and in lower part of medulla for connection with the spinal nerves. A pure cerebral (or central) paralysis does not occur, ex-

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cept when due to lesions or injuries confined to or above the basal ganglia of the brain. This is the typical crossed or alternate hemiplegia.

In the spinal paralysis the neurons located in the anterior horns of the spinal cord (*i. e.*, for motor paralysis), and the neuraxons of the central neurons are affected. These neurons (the spinal) are called lower, primary or peripheral neurons, transmit impulses from the cerebral cortex through connection with the central neurons, and from the spinal cord to the muscles. Arrest of their functions is also called peripheral paralysis, which must be distinguished from paralysis of the peripheral nerves. If the lesion is transverse, both sides innervated from below the injured segment are affected. The condition is known as paraplegia, is diagnostic of the spinal injury or lesion if bilateral injury or lesion of the brain can be excluded.

These forms of paralysis are caused more often by tumors, hemorrhages and toxins following infections than by trauma. When trauma is the genesis, early operative measures are called for. If these are contraindicated or futile, the injury is so serious that prognosis is well nigh hopeless for improvement. If the patient survives, the distribution of the injury has to be considered. The motor neurons in the cortex for a certain group of muscles are so scattered that in an injury or lesion only a part of them may be destroyed and in the spinal cord the motor neurons to one muscle may be located in three different segments. Thus a number

may escape destruction and some muscle-fibres in the affected muscles may still be innervated. This offers the opportunity to restore or improve function by means of massage. The muscle fibres which are still active can be so developed and strengthened by means of massage, active and passive movements, as in some measure, to make up for the power lost. To be more exact, if approximately 50 per cent of the neurons supplying a muscle are destroyed, the strength of the muscle fibres still innervated can be doubled, whereby normal function is restored. If a greater number of neurons are destroyed it is more difficult to restore normal function, while some improvement is certain, but if all the neurons supplying the muscle are out of action, nothing can be accomplished.

The scope of this paper does not permit further discussion of these forms, but paralysis, due to injury of the peripheral nerves, will now be considered.

The peripheral nerves may be injured by compression, traction or hypertension, contusion, lacerated, incised, punctured and gunshot wounds. The median, ulnar and external popliteal nerves are most frequently injured.

Paralysis is produced by compression in several ways: bandages, splints or casts, dislocations, fractures with displacement, callus formation, cicatrices after injuries or operations, faulty positions as in sleeping or Saturday night, post-anesthetic paralyses, etc., or pressure from a blood clot or confined effusion due to injury in

the nerve, the sheath or externally to the nerve. A fascia contracting due to irritation may strangulate a nerve sufficiently to produce paralysis. Crutches is a well-known cause of pressure paralysis.

The Erb-Duchenne paralysis is an illustration of how sudden traction will interfere with function in nerve fibres. This is caused by a sudden and violent abduction of the head and neck, injuring the brachial plexus on the opposite side to which the head is thrown.

Contusion may produce paralysis if the nerve is compressed against the bone with sufficient force. Mr. W. injured the circumflex nerve by a blow on the head of the left humerus in releasing a coupling pin. This was stuck and, in using force, it came out suddenly and he was thrown against a bar. The accident occurred on Nov. 7; he called on the 10th and complained of severe pain in shoulder day and night and inability to elevate the left arm. He was given local massage on the 10th and 11th, after which function was restored and the pain relieved.

In fractures or dislocations caused by direct violence, the same force may arrest the function of any intervening nerve. In the late Russo-Japanese and Boer wars, the musculo-spiral and sciatic nerves were those most frequently injured by gunshot.

In an injury to a nerve, it may be totally severed or a greater or smaller number of its fibres (axons) may be cut across, leaving the

rest intact. The sheath may or may not be cut across.

The diagnosis of paralysis may appear to be quite easy, but is often difficult and therefore in many cases the condition is not noted where only a part of, or a single, or a few scattered muscles are involved. This is due to the fact that in voluntary movement often a number of muscles assist in one action and if one or part of one is not active it may easily be overlooked. So, for instance, in a case I am now attending to, oblique fracture of right humerus at the surgical neck, with unreduced subglenoid dislocation, 6 months old, the lower branch of the circumflex is involved, paralyzing the posterior part of the deltoid.

Such conditions will be disclosed by direct percussion of each individual muscle. If the muscle does not react for the percussion by a quick contraction followed by relaxation, there is a lesion in the nerve which supplies this part. This should be compared with the corresponding opposite side of the body, if this is not injured. Of course, the electric reaction will also decide the question, but this is not so "handy" clinically as the percussion. Where all the muscles participating in the mobility of a part are affected the condition is evident.

Prognosis in paralysis due to injury of the peripheral nerves, is favorable as to recovery under proper conditions. The distal fragment of a severed nerve fibre (neuraxon), will degenerate and regeneration proceeds from the

proximal fragment, provided there is no obstruction. This will only occur in the path occupied by the distal fragment, *i. e.*, in the same sheath, and when the sheath is injured this is reconstructed by the local cells, *i. e.*, it depends on local circulation for repair. For this reason the fragments should be approximated and sutured together, as soon as practicable in all open wounds, and an incision should be made for this purpose, if not contraindicated, in all cases of internal nerve trauma where a separation of the fragments is probable. This should be done with as little trauma as possible, to avoid future contractures.

All external and internal pressure should be eliminated and in open wounds asepsis must be instituted and maintained. Local and constitutional infections and dyscrasiæ will delay and may prevent recovery. As the nerve is regenerated from the proximal fragment if severed, the time required for recovery is longer, in proportion to the length of the distal one.

The rôle of massage in traumatic paralysis is mainly to reduce pressure. It may be used as a prophylactic or corrective measure. In fractures so situated that the callus may encroach upon a nerve in the vicinity, also in injuries where the nerve may get caught in the cicatrix, local massage may prevent this before the nerve is affected. Thereby a long period of invalidism may be prevented. Where the nerve is actually involved in fracture-dislocations, callus-formation, vicious cicatrices,

contractures or hyperplasias due to contusions or other irritations, massage is a very valuable corrective measure. Where the nerve is directly affected by fracture or dislocation, these, of course, should be reduced before massage can become available, but even in old unreduced dislocations and vicious union it has proven valuable in reducing the existing paralysis.

The procedure in such cases is first to locate the lesion in the nerve and decide upon its source. If due to callus formation, hyperplasias or cicatrices, these must be reduced by strong local friction which produces a fatty degeneration of the superfluous formations and the products are absorbed and carried off by the local circulation. The absorption and elimination as well as the local metabolism are improved by local centripetal strokings on the surface with modified pressure. Repeated passive movements of the joints in the region will also stimulate the local circulation. The friction is performed with the distal phalanx of the thumb or one or two of the fingers, moving in small circles under considerable pressure, if necessary reinforced by the other hand, over the offending indurations, commencing at their proximal margin and gradually working all over them. The cuticle of the area manipulated should follow the excursions of the fingers unless some lubricant is used, to prevent abrasion of the skin.

When due to adhesions, frictions over the adhesions with passive, modified forcible move-

ments back and forth repeated daily until loosened. Where contractures exist, local moderate stretching with simultaneous frictions, if repeated often enough and persisted in, will eventually extend any living tissue, except matured osseous structure. If an old irreducible dislocation is the cause of the paralysis, attempt may be made to improve the mobility in the normal direction by reducing any existing adhesions, contractures and hyperplasias and by passive movement release the nerve.

In the meantime until recovery is accomplished the circulation must be maintained in the affected parts so as to counteract atrophy from non-use.

After the nerve is regenerated, the parts affected by the paralysis must be re-educated to perform their normal function both as to strength and facility by persistently repeated attempts at active, and by passive movements.

Contraindications for massage in traumatic paralysis are the same as in other conditions, namely: In general, acute systemic infection. Locally: Local infection, recent unreduced fracture or dislocation, foreign body if not removed, open wounds, aneurism, phlebitis and recently formed thrombus.

In cases where early massage is of importance the danger of recent fractures and open wounds can be circumvented by precautions as to apposition and asepsis.

Due to the kindness of Dr. S. C. Plummer I am enabled to report the following cases:

Case 1. Mr. R. M. sustained a fracture of the left humerus on March 19th, 1910. He called at my office on June 8th. At this time there was solid union, but the callus had involved the musculo-spiral nerve and there was paralysis in all the muscles supplied by this nerve below the fracture. There were sensory disturbances, drop-wrist and the patient was unable to extend, or supinate the forearm by action of the triceps or supinators.

He was given daily massage until Oct. 13, 109 treatments, and returned to work with nearly normal strength and function.

Case 2. Mr. W. E. M. sustained a fracture of the right clavicle on Aug. 19, called Sept. 21. Fracture healed with good apposition, but the deltoid was paralyzed either due to pressure or contusion on the circumflex nerve, and the patient was unable to abduct or elevate the right arm. He is still under treatment, has so far been given local daily massage 62 times, and is now able to elevate the arm when extended laterally, half way to the level of the shoulder.

Case 3. Mr. A. M. fractured the right tibia and fibula in upper third on Sept. 24, 1909. On examination March 3, 1910, I noted: the right leg flexed at the knee to nearly right angle, movement of the knee very limited; quadriceps atrophied, patella retracted to upper part of lower third of thigh. The tibial tubercle apparently enormously enlarged. All muscles below knee paralyzed and atrophied, all joints below knee ankylosed. Some mobility

at the seat of fracture. There was no sensation below middle of leg except a deep, dull ache. The fracture is a simple one and the skiagraph shows it to be impacted, comminuted, complete and it is complicated by injury to both popliteal nerves.

The patient also sustained a fracture of the surgical head of the right humerus with subglenoid dislocation at the same accident, which was successfully reduced and united in good apposition but leaving the shoulder joint ankylosed at the time of examination.

He has had daily massage since March 3d. At present there is free movement of shoulder and of knee, sensation present and all muscles react to direct percussion. Ankylosis is still present in the ankle joint due to contracture of posterior tibial fascia, and also in the metatarso-phalangeal joints. This I expect to correct in a comparatively short time.

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DISCUSSION.

Dr. T. S. Waud, Germania, Iowa: I would like to ask the essayist a question, as I see that he has made a very thorough study of the past and present tense of paralysis.

In my district I have been expecting cases of infantile paralysis. It is coming to us slowly but surely, and when it does come I feel that any advice I could get upon this question from this convention would be very gratefully received, and I think a great many other men who are making a study of this subject at the

present time would do the same. I would like to ask the doctor if he has made any study of this question, coming as it does under the head of paralysis, as to whether or not massage would be of benefit.

Dr. D. F. Stough, Geary, Okla.: In response to the question Dr. Waud has asked concerning infantile paralysis, I might give my experience in the case of a girl of 8 or 9. The paralysis had been existing about 3 weeks when she came to me, and involved both of the left limbs. She was able to walk only by dragging the foot, and had but very little control of the left arm, had very little grip and could not raise her hand more than a foot from the body either sidewise or straight. I gave both active and passive massage, about 25 treatments, after which the girl could walk with almost no limp, had fairly good use of the arm, could comb her hair, raise the hand above the head, etc. The last I heard from her was a few weeks ago, when it was said that no signs of any trouble whatever were apparent. I had a few cases of infantile paralysis some years ago in which I did not use massage, cases which I believe to have been similar to this, and the results were very poor. So I think the massage in this case brought about the good results.

Dr. Waud: I would ask the manner in which you used massage?

Dr. Stough: I just used it for the purpose of increasing the nutrition by stroking and rubbing, and I also applied deep massage for

the purpose of increasing the blood supply to all the parts as deep as the bones. When I had finished a treatment I could see a distinct hyperemia of the limb. I spent probably about 45 minutes in a treatment covering both limbs. I had never made a practical study of massage and just used what I thought best in this case to bring about increased blood supply to the parts. I attribute most of the good results to deep pressure along the spine to increase the blood supply to the spinal nerve roots.

Dr. Waud: How often did you give the treatment?

Dr. Stough: Daily.

Dr. C. H. Hoffman, Little Rock, Ark.: Infantile paralysis is an infection and the toxins of the infection destroy principally the large nerve-cells situated in the anterior columns of the cord. Those cells do not reach full development until the individual attains the age of 19 to 22, consequently they are more easily and readily injured by the toxins of the various infectious diseases, and particularly by the toxins of the germ that produces infantile paralysis, than they would be in the adult.

In the adult we have a paralysis similar to that which we find in the infant, but it affects the cells in the brain more frequently. So we call that a polioencephalitis, and the other we call a spinal poliomyelitis. Massage is of some benefit there, but it has to be applied carefully because any over-exercise or over-stimulation of those cells after they have been injured may

bring about their death and complete destruction. If a case of infantile paralysis improves to a certain extent, in all that I have seen there is gradually more territory involved than in those cases which are permanent afterwards. In some we have paraplegia, not only the limbs being involved but the ankles also, as well as some of the muscles of the upper extremity. In 4 or 5 weeks after infection some improvement naturally takes place, in which the function may become normal in some muscles while other muscles remain weak. Massage does good in so far as it stimulates the blood supply to the muscle and prevents wasting, in stimulating better nutrition to the structures of the joints, and in dislocations also. But recent investigations in regard to the etiology of poliomyelitis have taught us, certainly in the case of children that have been so infected, that we must go to work and disinfect the nasal secretions, the discharge from the urethra, the uterus, etc., in order to prevent the spreading of the disease and also to prevent the child from constant reinfection.

Massage is good if applied intelligently, but it must not be over-done because some of the nerve-cells which have been injured can be easily and readily damaged by any over-exercise or over-stimulation that is applied to them.

Dr. Engelbrection (closing): In considering the varieties of paralysis, we find that we have a good many different etiologic factors in-

yolved. The paralysis brought about by hemorrhage in one of the cerebral hemispheres, called hemiplegia, we can consider practically the same as a traumatic paralysis. This condition is due to a blood clot destroying a certain number of neurons supplying the part paralyzed, and the chances for recovery depend entirely on the number of neurons so destroyed.

In regard to the paralysis which comes on slowly and gradually, what might be called 'senile paralysis,' this is not a paralysis at all.

Answering the question that was asked as to infantile paralysis, I do not give very much encouragement. There is a great area of neurons involved due to infection, this spreads and becomes widely diffused, and the chances are that all the neurons supplying the parts affected have been destroyed. It is not a paralysis, in which the injury is confined to a small area. In most of these cases recovery is very doubtful. It is in the same class as any infectious paralysis. We have post-typhoid paralysis; they are in the same class—a great area involved, and every one of the neurons supplying the parts affected has been destroyed. And in such cases we cannot accomplish anything for the reason that all massage can do is to strengthen those muscle fibres that are still under nervous stimulation to such an extent they will do the work of the ones not acting. Of course, if many of them are inactive we cannot do much and if all are inactive we cannot do anything.

